IMPROVED METHODS FOR STAKEHOLDER ANALYSIS TO UNVEIL VITAL ROLES AND RESPONSIBILITIES IN THE FUTURE FLEXIBILITY MARKETS

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ABSTRACT

This paper presents a novel stakeholder analysis method based upon mapping. The method is applied within an ongoing research and innovation project under the umbrella of the H2020 program. Using the maps relevant stakeholders are evaluated to determine opportunities and barriers in the energy market that can accelerate or stall business initiatives with the aim to capitalize on end user flexibility. The results show that mapping is an effective tool in revealing attitude of different stakeholders towards flexibility markets and platform-based business. The analysis is further used to shape exploitation activities of the project.

INTRODUCTION

Increasing share of distributed energy resources in the power grid is rising challenges related to its reliability and power quality. Flexibility markets that enable the optimal utilization of flexible energy loads at the end users' premises can help solving such challenges. The H2020 project INVADE, funded through the European Union's Horizon 2020 Research and Innovation program under Grant Agreement No. 731148, approaches this issue by creating a cloud-based platform for flexibility services and with strong focus on energy storage [1]. Understanding the key roles and responsibilities of stakeholders to be engaged in the INVADE platform is vital for its successful implementation in a flexibility market context. Figure 1 shows main stakeholders types in the INVADE ecosystem.
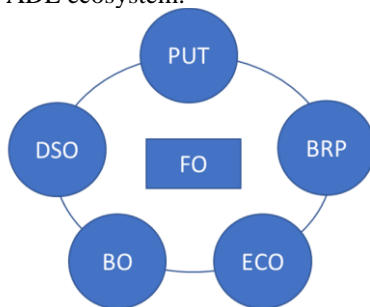

Figure 1: Primary beneficiaries and stakeholders that surround the INVADE Flexibility Operator (FO): Distribution System Operator (DSO), Public Utility (PUT), Balancing Responsible Party (BRP), ECO-system, and Building or property owner (BO) which includes consumers, prosumers, and EV station owners.

Central to the INVADE ecosystem is the flexibility operator (FO) whose role is to manage flexibility and storage assets via a cloud based platform. Successful market entry of FO and future capitalization of research done in the project requires deeper understanding of relevant stakeholders. Stakeholder analysis is an effective tool for identifying and understanding sources of support and resistance. Such understanding will help targeting right stakeholders for future exploitation activities in the project. Such activities are: stakeholder engagement workshops, face-to-face interviews, exploitation user group creation, and business and exploitation plan development.

This paper evaluates stakeholders relevant to INVADE project using mapping techniques. The structure of the map originates from the classical theoretical work on stakeholder analysis provided by Mitchell [2]. However, the techniques they propose are strongly modified to match the goals of the INVADE project and to fit into the context of flexibility markets and platform-based business models.

STAKEHOLDER ANALYSIS

The works of Porter [3] [4]and Mitchell et al. [2] are the most prominent analytical frameworks used to perform stakeholder analysis at different levels. The frameworks have been widely applied across various sectors. Mitchell developed the stakeholder dynamism model to assist the work of project managers. Traditional managers deal with intra-sectoral projects in mature ecosystems. Porter developed his cluster and five forces model to assist mangers in developing business strategies. Limitations of these frameworks are revealed when innovations are to be assessed [5][6][7]. Existing in the literature adaptations to the frameworks suggest that these need to be modified based upon purpose of the analysis.

Innovation projects like INVADE have different needs. The scope of INVADE goes beyond the project to include exploitation of outcomes in a broader context. The INVADE ecosystem is not yet developed and this is potentially a multi-sector innovation. Thus, developing further the analytical frameworks provided by previous literature gives us a powerful tool for improved stakeholder analysis.

Application of Porter's five forces model requires more market maturity in the INVADE ecosystem than there

exists today. On the other hand, Porter's cluster model goes deeper into exploring new markets for a firm's products/services. Thus, the questions at hand are more generic and broader in context. As such, the cluster model becomes relevant at a later stage of a project in order to develop exploitation plan. Another widely used tool is Power-Interest matrix [8] which does not provide enough dynamics to understand the behaviour of stakeholders in the market. Mitchell's model is therefore chosen to be developed further as it is free from market maturity constraints and provides the required understanding of stakeholders.

IMPROVED STAKEHOLDER MAPPING

Mitchell maps stakeholders across three attributes - power, legitimacy and urgency. Based upon these maps stakeholder dynamism is derived. The innovation characteristics of the INVADE project require modifications of the attributes for stakeholder analysis. Modified attributes lead to different understanding of the maps. Moreover, the three attributes do not completely reveal all the information required for effective exploitation of the INVADE outcomes. Therefore, two additional attributes are introduced along with a complimentary map inspired from transition studies [9].

The stakeholder mapping approach will be presented in the following sequence: First, the five attributes for stakeholder analysis are described. Then the two maps derived from the five attributes are explained. The developed stakeholder maps aim to assess stakeholders across various characteristics. The stakeholders analysed are considered directly or indirectly related to the INVADE cloud-based platform for flexibility services. Yet, the evaluated stakeholder types should be regarded as eminent for any other flexibility market and to consider their attitudes might be decisive for the success or failure of the solution.

Stakeholder attributes

1) Power: Stakeholders have the ability to influence project outcomes. With respect to INVADE power comes from: a) Ability to affect the market penetration of an innovation. For this we look upon three parameters - current market share, geographic presence, and digital presence; b) Ability to influence final design of the innovation; c) Working capital and ability to mobilize capital; and d) Research and innovation ability of a stakeholder. Having one or a combination of these abilities brings varying degrees of power. Power is qualitatively assessed as high, medium or low.

2) Urgency: Relates to how urgent is the need for FO services to a stakeholder. Urgency provides a window of opportunity for an innovation to enter the market. Urgency is qualitatively assessed as yes and no.

3) Legitimacy: The definition of legitimacy as defined by Mitchell also needs to be modified for INVADE. In the context of INVADE legitimacy comes by acceptance from end-users and research/educational institutes. Legitimacy is like brand image of a stakeholder which can be assessed by how their activities are perceived in the society. End-users are consumers and prosumers of electricity (defined as Bos in figure 1). As such, BOs and educational institutes are the source from where legitimacy is derived. Endorsement by such stakeholders will attract interest of other players towards the ecosystem. Legitimacy of stakeholders is qualitatively assessed as present or absent.

4) Interest: This shows how interested a stakeholder is in outcomes/services to be provided through INVADE. Interest is qualitatively assessed by answering each of the following questions: a) Is there added value to the stakeholders and do they see this added value? b) Are incumbent stakeholders of energy sector conservative or open to innovation? c) Are the business strategy and goals of a stakeholder in-line with the ambition set for INVADE and the FO role? d) What motivates a stakeholder? e) Are stakeholders proactively seeking to take part in local flexibility markets?

5) Attitude: Stakeholders can be supportive or opposing to the INVADE solution depending upon how it affects their business and how open they are to innovations. Stakeholders are likely to have negative attitude when both their business and vision are adversely affected or when they see the innovation as a competition. The stakeholders' expected position in the flexibility ecosystem also helps in assessing their attitude. It is qualitatively assessed as positive or negative, or not having any attitude. An important note to make is that having interest does not mean having positive attitude.
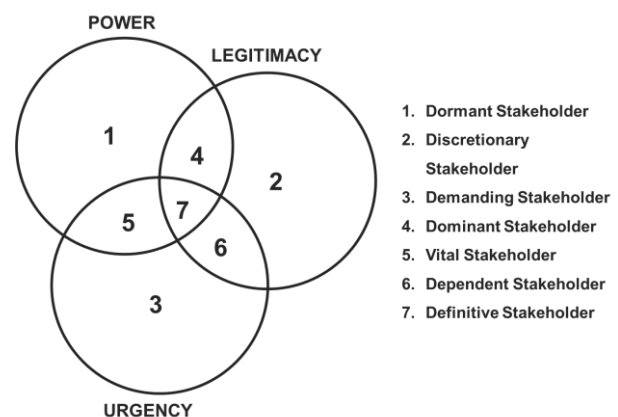
Power -Urgency-Legitimacy (PUL) map

Figure 2: Adapted PUL map from Mitchell's work.

PUL map is adapted from Mitchell's map. This adaptation is a result of modified definitions of legitimacy and urgency attributes. Combination of these three attributes lead to 7 different classes of stakeholders. All the classes have the same description as provided by Mitchell, except for "vital" stakeholders which were previously named for "Dangerous". Stakeholders characterized by both power and urgency are classified as vital and are expected to play key role in bringing

innovation to the market. Dominant, dependent and definitive are the classes which also have urgency. As in the case of Mitchell's map, the more the attributes defining a stakeholder, the more important for the exploitation work these stakeholders are.

Power-Interest-Attitude (PIA) map

This complimentary map is adapted from transition studies as described in [9] and partly inspired by Mitchell's map. Mitchell's framework does not provide insights on interest or attitude of stakeholders. As the map focuses on traditional project management concept, it is implicitly assumed that all stakeholders benefit from success of the project. However, for projects like INVADE, this is not always true. Interested stakeholders could also have negative attitude towards innovations. A good example is potential competitor who has interest in being updated with the progress of an innovation, but has a negative attitude towards it. Competitor could be any stakeholder that is developing a similar platform or perceives INVADE as threat to its business.
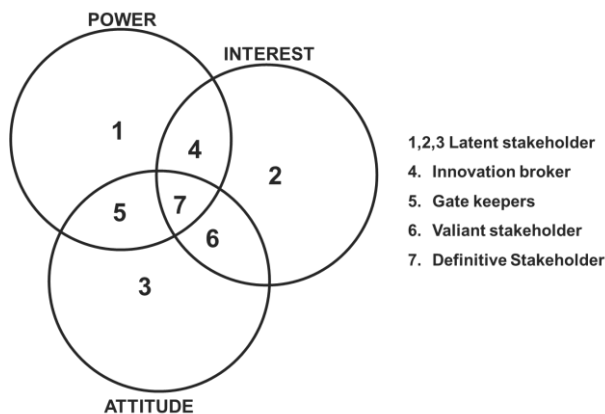

Figure 3:PIA map inspired from Mitchell's work.

Based upon possession of the presented in figure 3 attributes (power, legitimacy, urgency) 7 classes are identified. Classes possessing only one attribute are collectively called *latent stakeholders*. *Innovation brokers* are those stakeholders who possess power and interest. Such stakeholders have not yet developed any attitude towards INVADE as they are not sure how this would benefit them. By taking the role of a broker they want to test the innovation and explore how it can benefit their business. *Gate keeper*s are those who possess power and attitude. Because of power they could either open way for innovation in the market or block its entry. *Valiant stakeholders* possess attitude as well as interest. If valiant stakeholders have positive attitude then they would join forces and be allies. Yet, if they have negative attitude, they are likely to slow down the growth of innovation in the market. *Definitive stakeholders* are those who possess all the three attributes and have positive attitude towards the innovation.

Attributes of stakeholders are assessed qualitatively based upon information gathered from their websites and empirically using surveys/interviews.

Stakeholder analysis for INVADE

The stakeholder analysis is done with respect to both project activities and future business of the FO. The systematic approach used to perform stakeholder analysis consists of the following steps:

1. Identify different stakeholders in electricity sector
2. Identify attributes of stakeholders
3. Map the stakeholders on the PUL and PIA maps
4. Analyse dynamics of stakeholders
5. Generate generic stakeholder maps
6. Identify relevant stakeholders for exploitation purpose and create an exploitation strategy.

RESULTS AND DISCUSSIONS

Based on the two maps the various stakeholders identified are divided into different classes, as shown in table 1 and table 2. These classes provide insights on behaviour of stakeholders and reveal sources of friction and synergies. The provided insights support both future decisions of FO and exploitation activities of the project.

It is evident that the higher the number of attributes present in a stakeholder, the higher its salience. Energy utilities, and energy communities come out to be the most important stakeholders (considering both maps) and should, therefore, be prime target for exploitation. Other high salience stakeholders would serve different purposes. Legitimacy comes from the end-users and they should be engaged in the project. This will help INVADE to develop trust in the market. Municipalities have power and legitimacy and possess unutilized flexibility resources. Therefore, municipalities comprise an excellent target group for exploitation work and efforts should be made to create interest and attitude among them. Alliance with multi-national companies could bring in power attribute to both the generic INVADE concept and to the FO. Stakeholders having urgency can provide market entry to innovation or can be symbiotic partner in the market.

Due to space limitation, only a few key analyses of results are included in this paper. For a complete study on INVADE stakeholders authors refer to the report D3.2 from the INVADE project [10]. Furthermore, it is important to understand that the stakeholders' possession of attributes is likely to change over time and thus the analysis should be updated on regular basis.

The analysis from mapping is used to prioritize stakeholders to participate in the project's workshops. High salience stakeholders (especially the ones having high power) have been invited to join the exploitation user group. Inputs from such stakeholders are required to shape the business and exploitation plan for the INVADE solution. When it comes to face-to-face consultation the mapping suggests that high salience stakeholders having urgency attribute form the target audience. Addressing the challenges that such stakeholders face would increase the chances for the innovation's adoption.

Table 1:Result from mapping stakeholders on Power-Urgency-Legitimacy map.

Stakeholder class	Stakeholders
Dormant	Govt. bodies, Multinational electrical suppliers, Policy makers, Automotive manufacturers, Platform giants, DSO, Energy utilities
Discretionary	Consumers, Research institutes, Media
Demanding	Software developers, IoT suppliers, Aggregators, EMS providers
Dominant	Standardisation bodies, Municipalities, Association of energy players
Vital	Energy utilities, Retailers, DSO
Dependent	Prosumers, EV charging station owners
Definitive	Energy utilities, Battery manufacturers, Energy communities

Table 2:Result from mapping stakeholders on Power-Interest-Attitude map. (P) = power, and (I) = interest

Stakeholder class	Stakeholders
Latent	Govt. bodies (P), Municipalities (P), Consumers (I), EV manufacturers (P), Policy makers (P), DSOs (P), Energy utilities (P), Research institutes (I), prosumers (I), EV charging station owners (I)
Innovation broker	Multi-national electrical companies, Energy utilities, Battery manufacturers, retailers, Standardization bodies, Platform giants, Association of prominent energy players
Gate keepers	DSOs, Multi-national electrical companies, Energy utilities, Battery manufacturers
Valiant agents	Software developers, IoT suppliers, EMS platform providers
Agents of change	Energy utilities, Energy communities

With reference to INVADE the improved methods for stakeholder analysis help drawing the following key recommendations:

- Innovative energy system companies, electricity retailers, and EV operators are most suitable candidates for playing a FO role. Experience with platform-based business models is an advantage.

- Existing regulations are the biggest barrier to realize full impact of project outcomes. Therefore, a good exploitation plan should consider a go-to-market strategy with the current market regulations, i.e., in what way project results can be exploited before policy change happens.

- The business model applied by a FO can be decisive for whether powerful key stakeholders have a positive or negative attitude towards the flexibility platform solution
- DSOs and end users are most important stakeholders and to form alliances with those can be crucial for the FO's success in the market

CONCLUSIONS

In this paper the stakeholder analysis framework provided by Mitchell was developed further to meet the needs of the INVADE project. The adapted maps proved to be effective tool in harvesting stakeholders for exploitation user group and for engagement in workshops activities. The maps will be further used to select candidates for face-to-face consultations and to create an exploitation plan. The maps are also instrumental for the FO to assess who are the right stakeholder to form a strategic alliance with and against whom shielding is required. Furthermore, the maps helped in assessing which project partner is best capable to take the role of FO in the future. Although having specific focus on the INVADE platform solution, the ideas, methods, analysis and conclusions provided are highly relevant for any flexibility market environment that is to be established within the power system. This makes the stakeholder evaluation techniques applied in the current work and the consequent conclusions important reference point for successful flexibility market establishments.

ACKNOWLEDGMENT

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